

What I (we) claim is:

1. An engine exhaust emission purification apparatus comprising:
  - a reduction catalytic converter disposed in an engine exhaust system to reduce and purify nitrogen oxides by using a liquid reducing agent;
  - an injection nozzle that supplies by injection the liquid reducing agent to a flow of an exhaust emission upstream the reduction catalytic converter; and
  - a temperature maintenance device for maintaining a temperature of at least a part of a liquid reducing agent supply system including the injection nozzle and piping of the injection nozzle at a temperature lower than a boiling point of a solvent of the liquid reducing agent or equal to or higher than a melting point of dissolved matter.
2. The engine exhaust emission purification apparatus according to claim 1, wherein the temperature maintenance device is configured by a heat insulating member disposed between the exhaust system and a flange for attaching the injection nozzle to the exhaust system.
3. The engine exhaust emission purification apparatus according to claim 1, wherein the temperature maintenance device is configured by radiating fins provided to be juxtaposed to a flange for attaching the injection nozzle to the exhaust system.
4. The engine exhaust emission purification apparatus according to claim 1, wherein the temperature maintenance device is arranged to route a conduit of engine coolant to a flange for attaching the injection nozzle to the exhaust system to thereby cause heat exchange between the flange and the engine coolant.
5. The engine exhaust emission purification apparatus according to claim 4, further comprising
  - a nozzle temperature detecting device for detecting a nozzle temperature of the injection nozzle, and
  - a circulation control device for circulating or intercepting the engine coolant in the conduit based on the nozzle temperature detected by the nozzle temperature detecting device.
6. The engine exhaust emission purification apparatus according to claim 5, wherein the circulation control device circulates the engine coolant when the nozzle temperature is equal to or higher than the boiling point of the solvent of the liquid reducing agent or lower than the melting point of the dissolved matter.
7. The engine exhaust emission purification apparatus according to claim 6, further comprising a coolant temperature detecting device that detects a coolant

temperature of the engine coolant,

wherein the circulation control device prohibits a circulative flow of the engine coolant when the coolant temperature detected by the coolant temperature detecting device is equal to or higher than the boiling point of the solvent of the liquid reducing agent.

8. The engine exhaust emission purification apparatus according to claim 1, wherein the temperature maintenance device is arranged to lead a conduit for the engine coolant to at least a part of the liquid reducing agent supply system to thereby cause heat exchange between the liquid reducing agent supply system and the engine coolant.

9. The engine exhaust emission purification apparatus according to claim 8, further comprising:

a nozzle temperature detecting device that detects a temperature of the nozzle of the injection nozzle; and

a circulation control device for controlling circulation or interception of the engine coolant in the conduit, based on the temperature of the nozzle detected by the nozzle temperature detecting device.

10. The engine exhaust emission purification apparatus according to claim 9, wherein the circulation control device circulates the engine coolant when the temperature of the nozzle is equal to or higher than the boiling point of the solvent of the liquid reducing agent or lower than the melting point of the dissolved matter.

11. The engine exhaust emission purification apparatus according to claim 10, further comprising a coolant temperature detecting device that detects a temperature of the engine coolant, wherein the circulation control device prohibits circulative flow of the engine coolant when the temperature of the engine coolant detected by the coolant temperature detecting device is equal to or higher than the boiling point of the solvent of the liquid reducing agent.

12. The engine exhaust emission purification apparatus according to claim 1, wherein the temperature maintenance device comprises a heating device that heats at least a part of the liquid reducing agent supply system and a heating control device that controls the heating device.

13. The engine exhaust emission purification apparatus according to claim 12, wherein the heating device comprises a heater.

14. The engine exhaust emission purification apparatus according to claim 12, wherein a heat insulating member is disposed around at least a part of the liquid reducing agent supply system and the heating device.

15. The engine exhaust emission purification apparatus according to claim 12, further comprising a nozzle temperature detecting device that detects a temperature of the nozzle of the injection nozzle, wherein the heating control device controls actuation of the heating device, based on the temperature of the nozzle detected by the nozzle temperature detecting device.

16. The engine exhaust emission purification apparatus according to claim 12, wherein the heating control device heats at least a part of the liquid reducing agent supply system to a temperature equal to or higher than the melting point of the dissolved matter of the liquid reducing agent by using the heating device when the injection-supply of the liquid reducing agent is stopped.